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MADROÑO

A WEST AMERICAN JOURNAL OF BOTANY

Contents

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A WEST AMERICAN JOURNAL OF BOTANY

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BIBLIOGRAPHIC NOTES ON ABIES BRACTEATA AND PINUS COULTERI

David D. Keck

One of the publications that has proved to be a continual source of trouble to bibliographers is Aylmer Bourke Lambert's "A Description of the Genus Pinus," which appeared in five editions over the period from 1803 to 1842. The confusion aroused by this work has been due not only to the long period of years over which it was published, but also to the fact that copies of the same edition do not always agree in contents and arrangement. These editions have been described in detail by Renkema and Ardagh (2).

Now attention has been called again by Little (1) to certain names of conifers first published on extra pages in the 1832 edition. These names are familiar from later publication in other places. In this 1832 edition, also known as "editio minor," or the third edition, there seem to have been inserted in volume two between pages 144 and 145 such extra pages as the printer and engraver had ready at the time. The copies of this volume differ as to the number of extra pages that are included, which, so far as known, vary from none to a potential twenty. Renkema and Ardagh apparently were acquainted with six or seven copies of this rare edition, and Little examined four more. I have looked at the copy at Stanford University and the one at the University of California, Berkeley, both of which appear to be in original bindings.

This edition is always cited as appearing in 1832, and Little points out that it was available to Lindley before the latter's article on *Abies* appeared in the Penny Cyclopedia in 1833. The text for the "editio minor" was printed for an imperial octavo, but the plates were of the folio size common to the other four editions. Consequently, some copies appear as folios, with the text sheets pasted on larger pages of folio size, as those at the University of California, the New York Botanical Garden, and Kew, but in other copies, as the ones at Stanford and Arnold Arboretum, the beautiful plates have been either folded in or closely trimmed to fit the large octavo text.

The species of conifers listed by Renkema and Ardagh as occurring on the unnumbered pages between pages 144 and 145 of volume two are *Pinus Gerardiana, P. Sabiniana, P. monticola, P. grandis* (= *Abies grandis*), *P. nobilis* (= *Abies nobilis*), *P. Menziesii* (= *Picea sitchensis*), *P. Douglasii* (= *Pseudotsuga taxifolia*), and *P. dumosa.* All but the first and last of these are conifers of the United States. The other unnumbered pages contain notes on

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Corrected date line: Madroño, Vol. 8, pp. 145–176. January 28, 1946. Madroño, Vol. 8, pp. 177–208. May 2, 1946.

Australian and New Zealand conifers. Little made no additions to this list from the copies of the 1832 edition that he examined, but two more species are found in both of the California copies. The Stanford copy contains the extra pages for the species mentioned above except *Pinus Gerardiana,* and in addition contains *Pinus Coulteri* and *P. bracteata* (= *Abies bracteata*). The two latter species are also found in the copy at Berkeley, but of the above list it lacks the extra pages for *Pinus dumosa* and *P. Douglasii.* Several species described on the extra pages, including *Pinus Coulteri* and *P. bracteata,* are accompanied by the colored plates used also in the subsequent editions.

Authors have hitherto dated the publication of the Coulter Pine from the following: *Pinus Coulteri* D. Don, Trans. Linn. Soc. 17: 440, 1837, but now it may be given as *Pinus Coulteri* D. Don in Lamb., Descr. Genus Pinus ed. 3 (8°), 2: unnumbered p. betw. pp. 144 and 145, 1832. Fortunately no name change for this tree is involved.

The Santa Lucia Fir, however, must again take the name by which it commonly went prior to 1889 when Sargent called it *Abies venusta* (Dougl.) K. Koch, believing that this specific name, published in 1836, had priority over *Abies bracteata* (D. Don) Nutt., the specific name of which he thought was published in 1837. Little (*l.c.*) showed that both names were known in 1836, but did not decide which one was published earlier. Now the name and synonymy of this tree become as follows:

Abies bracteata (D. Don) Nutt., N. Am. Sylva 3: 137, pl. 118, 1849. *Pinus bracteata* D. Don in Lamb., Descr. Genus Pinus ed. 3 (8°), 2: unnumbered p. betw. pp. 144 and 145, 1832. *Pinus venusta* Dougl., Comp. Bot. Mag. 2: 152, 1836. *Picea bracteata* Loudon, Arb. Frut. Brit. 4: 2348, fig. 2256, 1838. *Abies venusta* K. Koch, Dendrol. 2(2): 210, 1873.

Several additional plates are found between pages 144 and 145 in the Stanford copy that deserve mention. These all occur without accompanying text. As in the case of the other plates in this work, the binomials beneath the plates lack the authority, so one does not know at a glance which names are published for the first time. These plates, some of which have numbers, are: *Abies Smithiana* (usually accredited as *A. Smithiana* Lindl., 1833 = *Picea Morinda* Link, 1841), *Pinus Llaveana* (usually accredited as *P. Llaveana* Schiede, 1838 = *P. cembroides* Zucc., 1832), *Pinus Brutia* (? = *P. bruttia* Tenore, 1826), *Araucaria Cunninghamii* (= *A. Cunninghamii* Sweet, 1830), *Juniperus chinensis* (? = *J. chinensis* L., 1767), *Juniperus excelsa* (not further identified), *Cupressus horizontalis* (= *C. horizontalis* Mill., 1768, which = *C. sempervirens* L., 1753), *Taxus Harringtonia* (usually accredited as *T. Harringtonia* Knight ex Forbes, 1839 = *Cephalotaxus Harringtonia* K. Koch, 1873). The last four of these, viz., *Juniperus chinensis, J. excelsa, Cupressus horizontalis,* and *Taxus Harringtonia,* do not occur in Renkema and

Ardagh's list of plates for any of the editions of Lambert. I have not had access to the later editions to determine whether these appeared there under other names. Possibly *Abies Smithiana* Lamb., *Pinus Llaveana* Lamb., and *Taxus Harringtonia* Lamb. are properly published in this Stanford copy under article 44 of the International Rules. It is indeed fortunate, however, that no name changing of an established species appears to be involved.

The above plates were of the usual engraved type common to the work. An additional engraved plate of an *Abies* cone-bearing twig without name or number has the name "Pindrow" penciled below it, probably much later. The first regular appearance of a plate of this species in Lambert was in 1837.

Finally, in the Stanford copy also are unlabelled colored drawings readily recognized as *Pinus tuberculata* Gord. not D. Don (two cones on two pages), *P. muricata* D. Don (two cones on one page), and *P. radiata* D. Don (two cones on two pages). These drawings apparently were originals made for the use of the engraver. These species were all legitimately published some years later in various works.

Grateful acknowledgement is made of suggestions received from Mr. Alfred Rehder of the Arnold Arboretum in the preparation of these notes.

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A NEW NOLINA FROM SOUTHERN CALIFORNIA

Howard Scott Gentry

While visiting at the San Diego Museum of Natural History during the summer of 1945, my attention was called by the curator, Mrs. E. B. Higgins, to a *Nolina* that she and Mr. Harbison, entomologist of the same institution, had recently discovered near the Dehesa School. This locality is about eight miles east of El Cajon, San Diego County, California, and some fifteen miles north of the Mexican border in the bold, granitic mountains so characteristic of that region. Fire had swept the chaparral one or two years previous to our visit. The *Nolina* grew on the margins of what had been a chaparral slope and showed a marked preference for granitic outcrops and the coarse detrital edges of steep-sided gulleys, indicating that it had not been a close component of

chaparral, but rather an associate in the more open margins in the poorer, immature, arid soils.

Most remarkable was the discovery that what had appeared to be acaulescent, individual plants of *Nolina* were in reality flowering shoots from a horizontal, trunk-like rhizome buried below the soil surface. Recent gulley erosion had partially exca-

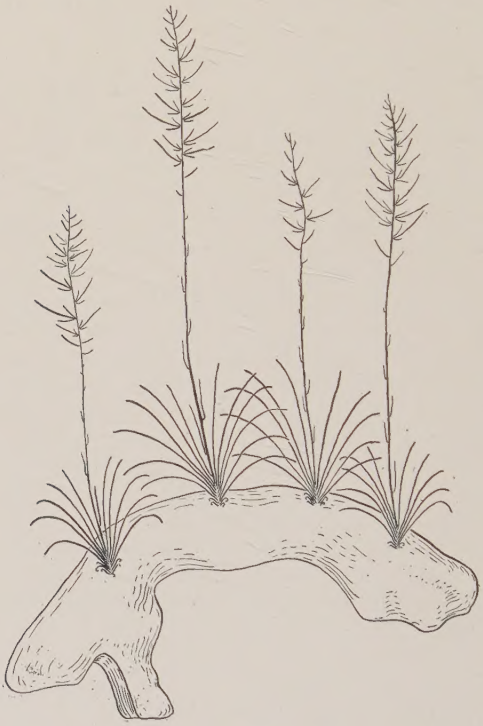

Fig. 1. Habit sketch of *Nolina interrata.*

vated several plants and had disclosed large, branching rhizomes 6 to 10 feet long and 8 to 12 inches or more in diameter, which bore small roots along the ventral side (text fig. 1). Some of the trunks showed partial burning with bark reduced nearly to charcoal. The aerial portions of the plants consisted wholly of growth made since the fire.

Specimens of *Nolina* were borrowed from the following institutions: University of California, Berkeley; California Academy of Sciences, San Francisco; University of Arizona, Tucson; University of Michigan, Ann Arbor. The author expresses appreciation to the curators of the herbaria at the above institutions.

Nolina interrata sp. nov. Lignosa rhizoma ferente rosulas subsessiles; cortice crasse reticulato, areolis truncate pyramidalibus, irregulariter pentagonis ca. 1 cm. latis et 5 mm. crassis; rosulis sessilibus typice 10–20-foliatis; foliis glaucis 70–90 cm. longis, 8–15 mm. latis, in apicem tenuem brunneolum efiliferum desinentibus, margine haud filiferis, denticulis biformibus alteris compositis 1–3-apiculatis inter se 0.5 mm. distantibus alternantibus cum alteris parvioribus simplicibusque; costis scabris, crassiuscule, denticuliferis; canaliculis intercostalibus profundis, apertis; panicula composita, laxa, 1.5–2 m. longa, internodiis 5–12 cm. longis, bracteiferis, bracteis foliaceis 20–40 cm. longis; pedunculis (terminalibus exceptis) ternis, centrali 12–16 cm. longo, lateralibus dimidio brevioribus, omnibus bracteolis scariosis dilaceratis vel truncatis vel varie imperfectis bases pedicellorum includentibus praeditis; pedicellis supra mediam articulatis, fasciculatis; floribus pistillatis staminodia ferentibus in perianthii segmenta; fructibus latioribus quam longioribus, 12–15 mm. crassis; seminibus viridiusculis, rugosis, 5 mm. longis, 4 mm. in diametro.

Plant with subterranean rhizome and aerial rosettes bearing flowering stalks, the bark coarsely reticulated into pyramidal pentagons 1 cm. or more broad and about 5 mm. thick; rosettes subsessile, (6)10–20(or more)-leaved, the bases of desiccated leaves persisting as brownish vestiges with decurved ends; leaves glaucous, 70–90(100) cm. long, 8–15 mm. wide near the bases, tapering to slender, dry, non-filiferous tips; margins fixed, armed with denticles of two sizes, the larger about 0.5 mm. apart and often compounded into two or three points; vascular costae scabrous with denticles discernible between the deep open intercostal sinuses; inflorescence an open compound panicle 1.5–2 m. long; scape internodes 5–12 cm. long with narrow leaf-like bracts 20–40 cm. long; peduncles, except the teminal, 3 from each node, the central one 12–16 cm. long, about twice the length of the two lateral ones, all with scarious, lacerate, long-acuminate bractlets 3–4 mm. long enclosing the pedicel bases, bractlets rupturing transversely in age to leave a truncate vestige; pedicels 1–3, fasciculate, jointed above the middle, the pistillate flowers with staminodes inserted on the perianth segments; fruits large, broader than long, 12–15 mm. wide; seeds yellowish, wrinkled, asymmetrical by the rather straight raphe, 5 mm. in long diameter, 4 mm. in transverse diameter, the hilum suprabasal with a conic caruncle which is more broadly and roundly duplicated at the axial apex.

Type. Slope west of Dehesa School, San Diego County, California, August 5, 1945, *Howard Scott Gentry 7330* (San Diego Museum of Natural History; isotypes, University of California, California Academy of Sciences, University of Arizona, University of Michigan).

The following additional collections from the type locality

have been studied: *Gentry 7330a, 7330b, 7330c, 7330d* (representing depauperate and robust extremes); *Gentry 7330e* (mature staminate inflorescence); *Higgins 25472,* June 14, 1939 (immature staminate inflorescence); *Gander 7695,* July, 1939 (fruiting). Mature seeds were collected by Mrs. Higgins on November 15, 1945. The species may also be found in Baja California inasmuch as similar habitats occur south of the border.

Nolina interrata resembles *N. Palmeri* in its foliage, but it differs from that species in its larger fruits, which do not dehisce to expose a persistent seed. Because of its well-developed rhizome (trunk), broad leaves, and large fruits, *N. interrata* belongs to the section Arborescentes of Trelease (The Desert Group Nolinae, Proc. Am. Phil. Soc. 50: 405–423, 1911). It appears most closely related to the *N. Beldingii* group, from which it is distinguished by its more glaucous, narrower leaves with more numerous marginal teeth of two sizes, with open denticulate intercostal sinuses (closed in *N. Beldingii*), and by the larger seeds. The glaucous leaf with coarse armature sets it apart from other known species of *Nolina.* The horizontal subterranean trunk or rhizome is especially noteworthy and suggests that this structure may be present in other members of the genus heretofore assumed to be acaulescent. This feature, which may readily be over-looked, would not have been discovered in this case had not erosion exposed portions of the rhizome.

A review of the literature and collections convinces me that the genus *Nolina* is not well understood. It possesses few striking morphological characters: the flowers are monotonously similar, and the fruits vary only as regards size and dehiscence. The seeds show differences in surface structure and color, but they are often absent in collections. The leaves are superficially alike, but they do differ somewhat in form of keeling, thickness, width, and marginal armor. The latter character and the microscopic rugosities of the ribbing, when combined with gross features, offer an approach to the problems of speciation. The nature of the minute denticles of the vascular ribs can be determined only by 20–30 × magnification. On the whole, the leaf appears to be the most satisfactory organ for determining the status of closely related entities.

Under *Nolina microcarpa* and *N. Bigelovii* are grouped complex series of variants. Under *N. microcarpa* on the basis of fairly uniform inflorescences have been lumped numerous leaf variants. Similarly, numerous leaf variants have been gathered under *N. Bigelovii* because of exfoliating leaf margins. Close inspection of leaf structure, however, shows that actually these broad specific groupings cover several variants that appear to have genetic consistency. Such species are based upon a few conspicuous characters maintained rather for taxonomic convenience than for taxonomic adequacy. The minutiae of leaf and bract may be more

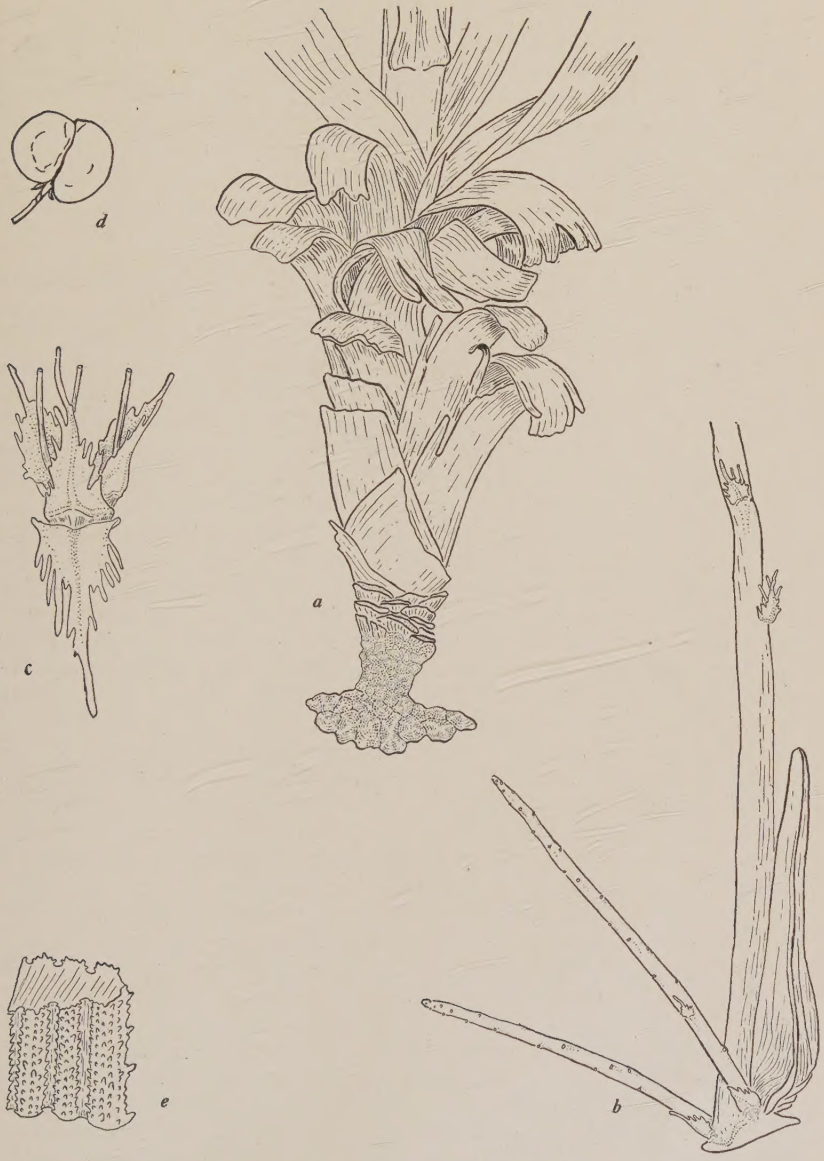

PLATE 19. NOLINA INTERRATA. Fig. *a*, base of rosette showing old persistent leaf bases and reticulate bark, $\times \frac{2}{3}$; fig. *b*, peduncles with bract and bractlets, $\times 1\frac{1}{2}$; fig. *c*, bractlets and pedicels, $\times 6$; fig. *d*, fruit, $\times 1$; fig. *e*, marginal section of leaf, $\times 15$.

expressive of genetic relationships, since greater differences between populations can be ascertained by their study. A fine series of California *Nolina* was gathered by Carl Wolf and put into cultivation at the Rancho Santa Ana Botanical Garden. One has only to examine casually this young live collection, with its several distinctive variants, to appreciate that only two names for California *Nolina* are insufficient. Not until close work on distribution with thorough collecting of populations is done can the Nolinae be understood.

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University of Michigan, Ann Arbor.

KATHERINE DAVIES JONES

1860–1943

Katherine Davies Jones, the fourth of seven children, was born of Welch parents in 1860 in a log cabin in Berlin, Wisconsin. In Wales, her father had been a singing master and her mother, daughter of the schoolmaster, was a singer of reputation. In this country, her father was first a colporter, selling Bibles and singing throughout the country, but soon he became a Congregationalist minister and was sent out to build and establish churches in rural communities, always moving westward. The children raised the family's food, were clothed by the occasional missionary barrel, an exciting event, and attended rural schools.

From the time she was sixteen until the family moved to Murphy's Camp, Calaveras County, California, in 1880, Katherine taught during the summers and attended school during the winters, going to Salem High School, then Normal School at Peru, Nebraska, and Latin School at Lincoln, Nebraska, followed by a year at the University of Nebraska. In Calaveras County, where her father's preaching station included six or seven churches, Katherine worked and saved until she was able to return to the University of Nebraska. After seven months, however, she was recalled to Murphy's Camp by the illness of her mother. Later that year the family moved to South Vallejo, California, where Katherine at first conducted a private school of her own and then taught for some six years in the public schools.

Through her aid, Guernsey, her younger brother, went to the University of California, where he graduated in 1891. Katherine sometimes visited her brother at Berkeley and attendance at some of Professor LeConte's lectures on zoology renewed her desire to return to college herself. She entered the University of California and graduated in 1896. For a year she taught biology and music at Hayward, but her health forced her to give up her teaching there and she returned to Berkeley. At first she assisted Pro-

fessor Jepson in his botany class and Professors Ritter and Torrey in their zoology classes. She taught herself typing and stenography and in 1899 was working in Professor Hilgard's office under A. V. Stubenrauch. Then for a time she gave such valuable private assistance to Professor J. Burtt Davy in agrostology that he asked for her transfer to the Department of Agriculture. After changes in the department there she kept the records of the Botanic and Economic Gardens of the Department of Botany. This work under J. Burtt Davy and H. M. Hall influenced her career greatly and aroused her interest in exotics, but her special interest in acacias came from her effort to help Mr. Stubenrauch, who had returned to California in charge of the seven Experimental Stations of the Bureau of Plant Industry, United States Department of Agriculture. He had her appointed to carry on his office work, and, to help him with the bulletin on *Acacia* he had to prepare, she took up the study of the genus *Acacia* on her own time. When he was called back to the Washington office, Katherine was asked, on very short notice, to prepare the treatment of *Acacia* for L. H. Bailey's Cyclopedia of Horticulture. Later, when Professor Bailey was preparing a new edition, the one in current use, Professor Setchell declared that Miss Jones was the best, if not the only, person in the country capable of revising the section on *Acacia*.

In 1910 Professor E. B. Babcock needed someone in Agricultural Education to gather seeds to be sent to the schools of the state, and again Katherine was called upon as the one person available who had the necessary training for the work. This led, in the next year, to her academic appointment on Professor Babcock's staff to teach in Agricultural Education. That summer she went East to study and visit schools in order to prepare herself for the work. On her return, she first assisted in the classwork but later had full charge of the courses.

The Department of Landscape Gardening was organized in 1913 under the direction of Professor Gregg, and, as he had just come from the East, he found Katherine's wide knowledge of our exotic flora of great value. A course in Plant Materials was to be given by Mr. R. T. Stevens who was in Europe; so Katherine started the course and after Mr. Stevens returned she continued to assist with the botanical aspects. When Mr. Stevens resigned in 1917, Katherine found herself teaching five classes, including all of the Plant Materials. As there were no adequate textbooks in this field, she organized the work herself, prepared keys to the plants as well as descriptions emphasizing the aspects of the plants that pertained to landscaping. She was thorough, conscientious, and inspiring to her students, and through them, her work became widely known and praised. At Harvard students were told that if they had passed her work satisfactorily, no further examination would be required of them for entrance to the Plant

Material classes there. Her students tell how they would follow the spry, tireless figure, like a flock of chickens, from one tree or shrub to another during an hour of each laboratory period while she told them of origin, habitat and uses; then they would return to the laboratory and study in detail specimens of these same plants, making leaf prints and writing descriptions, and she would drill them intensively in the subject matter. Such methods as these may seem elementary, but to this day, many of her former students admit that when confronted with a plant their immediate reaction is "botanical name, common name, origin." Katherine always maintained an interest in her pupils and liked to keep track of them, especially when they continued in fields that made use of the training that she had given to them, and her pupils, in turn, thought much of her and through the years kept in touch with her. A never-ending source of joy to her were the greeting cards that arrived from former students each holiday season.

In addition to her teaching, Katherine carried on a time-consuming and extensive correspondence with the general public, giving help whenever asked. When she retired from the University in 1930, she turned to private teaching, to writing, and to the furthering of more accurate nomenclature and botanical information among the nurserymen, the garden clubs and the general public. The California Horticultural Society and California Garden Clubs, Inc., honored her, and she stands as one of the notable women of California in the advancement of the botanical and landscape side of horticulture. Her herbarium, collected over a period of nearly forty years and especially rich in specimens of *Acacia* has been given to the University of California.—Mabel Symmes.

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ENNEAPOGON DESVAUXII AND PAPPOPHORUM WRIGHTII, AN AGROSTOLOGICAL DETECTIVE STORY

Agnes Chase

Enneapogon Desv., recognized either as a subgenus of *Pappophorum* Schreb. or as a distinct genus, has always been a puzzle because, though several species are well known, the type species could not be ascertained. The genus was described by Beauvois (Ess. Agrost. 81. 1812), who ascribed it to Desvaux. One species, *Enneapogon Desvauxii,* is figured (loc. cit., pl. 16, fig. 11) but not described, and four Australian species of *Pappophorum* described by Robert Brown are cited but not transferred. The figure, showing a dense panicle, the characteristic spikelet, and the lemma with nine feathered awns, is unmistakable as to the genus. Desvaux (Jour. de Bot. 1: 70. 1813) transferred Brown's species of *Pappophorum* to *Enneapogon,* preceded by the statement that he had examined a plant from "iles Manilles" that proved to be a distinct genus, close to the well-known genus *Pappophorum,* and in the same paper he cited *Enneapogon Desvauxii* as a synonym of *E. gracilis* (R. Br.) Desv. Later, because Beauvois had failed to do so, Desvaux described *Enneapogon Desvauxii,* "Habitat in Manilia" [sic] (Opusc. 98. 1831) and excluded it from the synonymy of *E. gracilis.* No species of *Enneapogon,* however, has ever been found in any of the Pacific Islands until recently in Maui, Hawaii, where it probably was introduced.

Because *Pappophorum Wrightii* S. Wats. [*Enneapogon Wrightii* (S. Wats.) C. E. Hubb.], belonging to the genus or subgenus *Enneapogon,* occurs in the southwestern United States from Texas to California as well as in Mexico and Argentina, the problem is of interest to us. In an attempt to identify the type of the genus, the writer searched in vain for *Enneapogon Desvauxii* in the Delessert Herbarium in Geneva, Switzerland, where a few of the Beauvois specimens were found, and in the herbarium of the Museum d'Histoire Naturelle in Paris.

Recently, Nancy Tyson Burbidge of the University of Adelaide, Australia, published "A Revision of the Australian Species of Enneapogon Desv." [Proc. Linn. Soc. London 153 Sess. (1940–41): 52–91, fig. 1–5. 1941]. Her revision was based on material in Kew Herbarium and on collections on loan there. Miss Burbidge states (op. cit., p. 53): "The war was responsible for the evacuation of Robert Brown's type material from the British Museum before it had been properly studied. . . . References made to his material are founded on the portions of his types which are at Kew." And (op. cit., p. 57) "In the British Museum there is a specimen labelled 'Enneapogon, Manilla, Herb. D. Desvaux,' in Robert Brown's writing, which indicates that the two authors were in communication at some period. This specimen, which is here accepted as a portion of the type, consists of an inflorescence with a culm bearing three leaves. In the axil of the uppermost is a small axillary inflorescence. It agrees in spikelet character and general habit with *Pappophorum Wrightii* S. Wats. (Proc. Amer. Acad. 18: 178. 1883), which therefore, lapses into synonymy." Comparison of the figure of *Enneapogon Desvauxii* in Beauvois (loc. cit.) with our American *Pappophorum Wrightii* shows that the two agree and further substantiates Miss Burbidge's conclusion.

The specific identity of the type is thus settled, but where was it collected and by whom? Experience in tracing the sources of Desvaux's species has shown that his cited localities are often erroneous. (*Panicum aciculare* Desv. of the eastern United States and the West Indies, in which the locality was given as "Indies orientales," is a good example). Because our southwestern states, where the species is frequent, were not explored botanically before 1830 and because *Enneapogon Desvauxii* was described in 1812, it seemed probable that the specimen came from Mexico. We learn from Leségue (Musée Bot. Delessert, p. 347. 1845) that Née, one of the botanists who collected in the Americas at an early date, crossed from Acapulco to Mexico City before he joined Haenke on the Malaspina Expedition. Née's collections were sent to Madrid where his herbarium is now preserved (op. cit., p. 451), and Lagasca, who was in charge of the herbarium there, was in communication with the French botanists. Sessé also collected in Mexico and sent his collections to Madrid, but there seemed less probability that his specimens would have been labelled "Manilla." These surmises were communicated to Dr. L. R. Parodi, of Argentina, who replied that in 1935 he had examined, in the herbarium in Madrid, a specimen "Ex Chile, Née iter," which was the same as *Pappophorum Wrightii*. Dr. Parodi had found that many of Née's collections in the herbarium at Madrid bore doubtful localities and he believed that since Née passed by Mendoza, Argentina, on his return from Chile, he might well have collected the *Enneapogon* at Villa Vicencio, on the eastern slope of the

Cordillera (i.e., in Argentina), where this species is still fairly common. Dr. Parodi thought that the specimens sent to Desvaux and shared by him with Robert Brown had probably come from the herbarium of Zea and were doubtless part of the collection in Madrid. Therefore, in spite of errors in data, the type has been located and identified and the very probable source of the specimen has been discovered. Our *Pappophorum Wrightii* Wats. thus becomes a synonym of *Enneapogon Desvauxii* Beauv.

With the removal of *Pappophorum Wrightii* from it, the genus *Pappophorum* can be limited to plants having one-nerved glumes and lemmas that are dissected into an indefinite number (ten to many) of fine, unequal, scaberulous awns. So limited, *Pappophorum* is confined to the Americas. *Enneapogon,* on the other hand, with seven- to many-nerved glumes and lemmas that are crowned with nine flat, usually plumose awns that are equal (or subequal) in length, is widely distributed. There are nineteen species in Australia, ten or more in Africa, and five or six in Asia, one of which, *E. borealis* (Griseb.) Honda, closely resembles the only American species, *E. Desvauxii.* In two of the African species of *Enneapogon,* the nine flat awns are not plumose. In *E. Desvauxii,* cleistogamous spikelets are produced in the lower sheaths; Miss Burbidge found cleistogenes in four Australian species, and the writer found them in one Asiatic and in two African species of *Enneapogon.*

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TWO SPECIES OF MICONIA FROM SALVADOR

H. A. Gleason

In most of the Melastomataceae the style, even in bud, is elongate and lengthens further during anthesis so that it is usually about as long as the filaments. How then shall we interpret a few "species" in which the style is permanently short or nearly aborted? Is this a specific character or merely a teratological condition? Within the section Cremanium of the genus *Miconia* there are five such species, all known from a few specimens only: *M. hemenostigma* Naud. (1851), "stylus fere nullus in umbilico ovarii inclusus," *M. biperulifera* Cogn. (1891), "stylo nullo," *M. purulensis* Donn. Sm. (1908), "stylus in floribus perscrutatis nullus," *M. minuta* Gl. (1925), "style 0.7 mm. long," and *M. brachygyna* Gl. (1930), "style 0.5 mm. long." The last three seem to be closely related and the short style may there be a group character; possibly the first should be included with them. But the second is quite different, and now I find a sixth in which the whole pistil is completely lacking.

Miconia sterilis sp. nov. Sect. Cremanium. Frutex bimetralis, caulibus juvenilibus 4-sulcatis densissime hirsutis denique glabrescentibus, pilis 1–2 mm. longis. Petioli 2–4 cm. longi, inferne glabri, superne sparse hirsuti. Laminae tenues, anguste oblongo-obovatae, usque ad 15 cm. longae 5.5 cm. latae, breviter acuminatae, integrae et ciliatae, basi obtusae, 5-pli-nerviae, supra glabrae, subtus ad venas primarias et secundarias sparse breviterque hirsutae; venae exteriores submarginales, secundariae sub angulo 70° orientes supra medium curvatae, cum venulis supra subplanae subtus vix elevatae. Panicula pyramidalis 8 cm. longa a basi ramosa, fere glabra, cymulis saepe 5-floris. Flores 5-meri. Hypanthium urceolato-globosum, ad torum 1.9 mm. longum, extus glabrum minute rubro-punctatum, parietibus crassis. Calycis tubus 0.3 mm. longus; sepala late depresso-semicircularia e sinibus rotundatis, 0.3 mm. longa; dentes exteriores minuti, adpressi, triangulari-acuminati. Petala alba, late obovata, fere equilatera, leviter retusa, 1.5 mm. longa, 1.7 mm. lata. Stamina isomorpha; filamenta complanata, 1.5 mm. longa, supra medium geniculata; antherae obovato-oblongae, 1.8 mm. longae, a basi ad medium 4-loculares, poris 2 latis dehiscentes; connectivum infra thecas subteres, ca. 0.5 mm. productum. Ovarium nullum.

Type. East side of Los Esesmiles, Department of Chalatenango, El Salvador, altitude 2200 meters, *Tucker 1100* (Herbarium of the University of California no. 693856). In general facies and structure of the anthers the species is strongly suggestive of the well known *M. theaezans* (Bonpl.) Cogn. It differs in its pubescence of simple hairs, its pli-nerved leaves, its 2-pored anthers, and the complete absence of the pistil. It may be more closely related to *M. biperulifera,* the anthers of which I have not examined. It is, of course, difficult to imagine a species in which all individuals lack a necessary reproductive organ. There is no present evidence to show whether this is a staminate portion of a dioecious or monoecious plant or merely a teratological specimen.

Miconia Tuckeri sp. nov. Sect. Cremanium. Frutex bimetralis, ramis juvenilibus tenuiter stellato-floccosis, denique fere glabris. Petioli 2–5 cm. longi, dense floccosi et supra sparse hirtelli. Laminae firmulae, anguste oblongo-ovatae, usque ad 15 cm. longae, 5 cm. latae, acuminatae, minutissime denticulatae, dentibus incurvis callosis, basi rotundatae, 5-nerviae, supra juventute minutissime furfuraceae mox glabrae, subtus ad venas minute furfuraceae et sparse hirtellae, pilis ca. 1 mm. longis; venae supra planae, subtus elevatae, secundariae fere transversae. Panicula pedunculata pyramidalis ramosa, 1 dm. longa, sparse furfuracea. Flores 5-meri. Hypanthium subglobosum, ad torum 3 mm. longum, minutissime rubro-punctatum. Calycis tubus 0.5 mm. longus; sepala rotundata a sinibus latis, 0.5 mm. longa; dentes exteriores triangulares, sepala aequantia. Petala alba, obovata, 2 mm. longa.

Stamina isomorpha; filamenta complanata, 2.4 mm. longa, supra medium geniculata; antherae oblongae, 2.4 mm. longae, 2-loculares, poro lato dehiscentes; connectivo ad basin dilatatum, brevissime productum, et infra thecas in lobos 2 laterales rotundatos deflexum. Ovarium semi-inferum, 3-loculare; stylus glaber, 4 mm. longus, superne incrassatus; stigma vix capitatum.

Type. Cloud-forest, east side of Los Esesmiles, Department of Chalatenango, El Salvador, altitude 2300 meters, *Tucker 998* (Herbarium of the University of California no. 693855). The plant resembles *M. purulensis* Donn. Sm. and *M. hemenostigma* Naud. in general aspect, but differs from both in its well developed style and considerably larger flowers.

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THE INTRODUCTION OF VIOLA LANCEOLATA INTO THE PACIFIC NORTHWEST

J. H. Schultz

Viola lanceolata L. is an abundant and conspicuous plant in several localized marshy areas in western Washington. The unexpected occurrence of this eastern species in this region has prompted much interest. Jones (5) held that it could be adventive here, but that on the basis of ecological evidence this was highly improbable. He thought, rather, that it was a relictual species which had been missed by previous collectors. Baker (2) speculated that seeds of this species had been carried in mud adhering to the feet of migrating water fowl from Venezuela, where it is known to occur. Baird (1) also has commented on the occurrence of this violet in western Washington, but she offered no explanation. Since *V. lanceolata* was previously not known from west of Minnesota, it is little wonder that its occurrence in the Pacific Northwest has invited comment.

Although many of the areas in which *V. lanceolata* now appears to be indigenous were intensively botanized many years ago this species was not collected. For example, Douglas (4) collected for many days near the mouth of the Columbia and on the Long Beach Peninsula in Pacific County, Washington. The writer is personally well acquainted in this area and has been able to locate specific spots in which Douglas collected on the Long Beach Peninsula from 1825 to 1827. Since Douglas collected species of violets and other plants which still grow there, it seems improbable that so keen a collector would have missed *V. lanceolata* if it occurred in the area at that time.

There appears to be a more logical explanation for the occurrence of this violet in the Pacific Northwest. *Viola lanceolata* is a common species in many cranberry (*Vaccinium macrocarpon* Ait.)

bogs in the Atlantic Coast and the Wisconsin cranberry districts. When the cultivated cranberry was first introduced into Washington late in the nineteenth century introductions were on a small scale and were limited to cuttings for propagation. However, from about 1909 to 1916 (3) the cranberry industry in Washington expanded rapidly and made extremely heavy importations of vines for propagation. These came chiefly from the Cape Cod and Wisconsin cranberry areas, in both of which *V. lanceolata* is common. Cranberry vines for propagation were purchased by the ton, and it was a common practice to mow parts of a bog and ship everything, cranberry vines and weeds alike, to the Pacific Coast in order to meet the demand for propagating material. It was undoubtedly in this manner that *V. lanceolata* was introduced into Washington and Oregon.

On the Long Beach Peninsula in southwestern Washington *V. lanceolata* is no longer restricted to the cranberry bogs but is common in low pastures and marshy areas, giving it the appearance of an indigenous species. That this is caused by the annual winter flooding and drainage practices followed in cranberry culture in that area is scarcely open to question. This violet is also a common weed in the cranberry bogs in the Grayland area, adjacent to the ocean near the Pacific County-Grays Harbor County line. Its occurrence at the south end of Puget Sound, where first detected by Jones (5), may be explained in the same manner. There have been periodic attempts to grow cranberries in this area, several bogs being cultivated there at the present time. Its occurrence in several widely separated localities, as noted by Jones, is thus accounted for. This is apparently the first report of its occurrence in Oregon, where the writer has seen it as a common weed in cranberry bogs near Seaside, Clatsop County. No specimens were taken.

Viola lanceolata is quite noticeable as a rather small herb with attractive white blossoms in April or May. At that season the plant is too small to be considered a weed of economic importance in cranberry bogs. However, in August and September when at the height of the cleistogamous flowering season, the plants are large and dense with foliage twenty to thirty centimeters high. It is at this season that the cranberries are ripening, and considerable economic loss frequently results from the shading and crowding caused by the dense growth of the violets.

The following specimens of *Viola lanceolata* have been deposited in the Herbarium of the State College of Washington, Pullman: cranberry bog, one mile north of Long Beach, Pacific County, Washington, May 28, 1944, *Schultz 4435* (vernal flowering condition); August 28, 1941, *Schultz 4121* (cleistogamous flowering condition).

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HERBERT JOHN WEBBER

While gathering oranges in his yard from a tree which he had planted and raised, Dr. Webber suffered a heart attack which was followed by his death on January 18, 1946, shortly after he had reached his eightieth birthday. That his last activity should have been concerned with a fruit which he had studied in one way and another for half a century seems eminently fitting to those who knew him well.

Affable, genial, unselfish, alert, energetic and optimistic, he merited that esteem of colleagues and students which he received. A charter member of the California Botanical Society, he was an enthusiastic and loyal member of the organization. Prominent also in the founding and work of the Botanical Society of America and of the American Genetic Association, his cooperation was freely given to promote welfare of science.

His never-tiring interest in plants endeared him to his teacher, Bessey, at the University of Nebraska, who inspired him with the active scientific spirit which dominated his subsequent life. Webber received the degree of B.S. in 1889 and A.M. in 1890 at the University of Nebraska. He did graduate work at Washington University, obtaining the degree of Ph.D. in 1901. The scientific study of living plants in the out-of-doors became a passion with him when, in 1892, he went to Eustis, Florida, in the service of the United States Department of Agriculture to investigate problems connected with the citrus industry, in association with Walter T. Swingle. At once Webber was fascinated with the new problems in botany in that subtropical region. Writing to Bessey, he waxed enthusiastic about the unique distribution of plants in the hammocks and sandy plains, was excited by the discovery of plants like *Zamia* and *Casuarina,* and the alluring field of citrus culture. In view of his later importance in that field, his remark in a letter to Bessey had singular significance. "Orange studying I find a delight. Hope I may continue to like it as well."

The primitive spermatophyte, *Zamia,* so aroused his scientific curiosity that he somehow found time, aside from his regular

duties, to study it. His first paper, entitled "Peculiar Structures Occurring in the Pollen Tube of Zamia," published in the Botanical Gazette in June, 1897, announced that the male gametophyte produces motile antherozoids. Two more papers followed in rapid succession, establishing this novel discovery. When he read a paper containing the results of his researches at the meeting of the Botanical Society of America at Toronto in that year, he knew that it would be difficult to convince his audience that a seed-plant has motile antherozoids, therefore he showed slides representing all the important stages. Fortunately for him the mature antherozoids of *Zamia* are probably the largest male gametes known in the plant kingdom, being plainly visible to the naked eye. Still, there was incredulity in the minds of many botanists. Rodgers says, "Some went so far as to believe that Webber's sanity had been affected by the warm climate of Florida." The following year Webber read a paper at the Boston meeting of the American Association for the Advancement of Science in which he described the formation of the cilia-bearing membrane of the antherozoid. In 1901 Webber's work on *Zamia* was culminated with the publication of his researches by the United States Department of Agriculture in a ninety-two page, fully illustrated paper.

His discovery of motile antherozoids in *Zamia,* his cooperation with W. T. Swingle in producing the first interspecific hybrids in *Citrus* having resistance to low temperatures, his influence on the development of genetics in the Department of Agriculture in Washington and at Cornell, established Webber's scientific abilities at home and abroad while he was still a young man.

His hybridization of species and varieties of citrus led him to ponder the principles of heredity and he was alert to the new possibilities in the laws of Mendel, rediscovered in 1900 by DeVries and Correns, and in DeVries' theory of mutation published in the same year. For the next quarter of a century Webber's name was linked to studies on the breeding of oranges, cotton, corn, pineapples, timothy and potatoes. He was appointed in 1900 to be "Physiologist in Charge of the Laboratory of Plant Breeding" in the United States Department of Agriculture where he was successful in introducing scientific principles into the agricultural work in this and other countries.

In 1907 Webber was called to a professorship of experimental plant biology at Cornell University where he worked for five years, resigning to take the directorship of the newly founded University of California Citrus Experiment Station and Graduate School of Tropical Agriculture. He arrived in Riverside in July, 1913, and threw himself into the tasks concerned with organizing the new institution, building up an Experiment Station which now has an international reputation for its researches in subtropical horticulture and related problems.

At the invitation of the department of agriculture of the Union of South Africa, he spent the year 1924–25 in studying the citrus industry in that country and advising the government on the organization of agricultural education and research. Thence he visited various citrus growing regions in the Orient and completed a journey around the world.

Dr. Webber was appointed chairman of the Division of Subtropical Horticulture in the College of Agriculture, University of California, in 1921 and took up residence at Berkeley; served as acting dean of the College and Director of the Experiment Station in 1923–24; returned in 1926 to Riverside to resume his former position as Director of the Citrus Experiment Station; became professor emeritus in 1936. He knew no such a thing as retirement however, going daily to his quarters in the building or making studies in the orchards, or discussing horticultural matters with members of the staff.

One of his first accomplishments in 1913 at Riverside was the formation of the Synapsis Club, an informal seminar, debating society, colloquium, which has afforded the opportunity for the workers in the sciences connected with horticulture to report on their researches and, more important, to get the criticisms of their comrades in science. Membership in the Synapsis Club was composed of staff members of the Citrus Experiment Station and of the branches of the United States Department of Agriculture stationed in southern California, but interested citrus growers were welcome at the meetings. That this Club has carried on for more than thirty years is strong evidence of the foresight and wisdom of the founder.

This is not the place to review Dr. Webber's voluminous scientific writings which were published for the benefit of botanical and agricultural workers at home and abroad, but reference must be made of his crowning success in planning and producing, in collaboration with Dr. L. D. Batchelor, of the great work entitled "The Citrus Industry" in three volumes. The first volume was published by the University of California Press in 1943, and the second will be ready shortly. In scope and wealth of information it far surpasses anything of the sort ever attempted. In addition to editing the work, Dr. Webber wrote over 300 pages of the first volume, including a comprehensive chapter on the cultivated varieties of *Citrus*. The second volume will be devoted to matters concerned with the production of the crops, to which Dr. Webber has contributed two chapters: "Nursery Methods" and "Citrus Rootstocks; Their Characters and Reactions."

Dr. Webber married on September 8, 1890, Lucene Anna Hardin (deceased August 16, 1936). Their children were Mrs. Eugene Frances (Webber) Morrison, Mrs. Fera Ella (Webber) Shear, Herbert Earl Webber and John Milton Webber.—Howard S. Reed, Department of Botany, University of California, Berkeley.

FIVE NEW SPECIES OF NAVARRETIA

Herbert L. Mason

In preparing the manuscript of the Polemoniaceae for Abram's Illustrated Flora of the Pacific Coast States, the following five species of *Navarretia* were found to be undescribed. All species will be illustrated in that work.

Under the name, *Navarretia Bowmanae,* Miss Eastwood described a plant from Anderson's Ranch, Lake County, California. In the discussion accompanying the description, she called attention to its relationship to *N. cotulaefolia* and hazarded the opinion that it may be "too closely allied" to that species. In this opinion we concur. Jepson (Flora of California, p. 152, 1943), concluded that the plant described by Miss Eastwood had blue or possibly white flowers which had changed to yellow on drying. On the basis of this decision, Jepson re-diagnosed *N. Bowmanae* and tentatively referred to that name a group of specimens unlike the type specimen described by Miss Eastwood. The individuals in the large colony of yellow-flowered plants seen by the writer at the type locality, however, do agree with Miss Eastwood's description. The plants placed under *N. Bowmanae* by Jepson, on the other hand, fall into two groups representing two distinct entities, both of which are undescribed. One centers in the Sierra Nevada foothills and adjacent plains from Calaveras County to Eldorado County and adjacent Sacramento County with an outlying occurrence in Solano County. The other occurs in Tehama and Lake counties, thus centering on the north and west sides of the Great Valley. Both entities appear to occur in soils rich in ferro-magnesian metals.

Navarretia eriocephala sp. nov. Annua erecta, 5–35 cm. alta, simplex vel racemosa-ramosa; folia rache crasso, lato vel tenui, 1–5 mm. longa, bipinnate seccata; bracteae rigidae-coriaceae rache lato, bipinnate seccata, subter dense albae-villosae; flores in capitibus; calyx inaequaliter seccatum, 2–3 lobae integrae, aliae dentibus, 6–8 mm. longae; corolla 5-mera infundibuliformis, 8–12 mm. longa, lutea saepe purpurea-maculosa; stamina ad faucium aequaliter affixa, filamenta inaequaliter, 1–3 mm. longi, illorum maximi exserti; stigma 2-lobatum; capsula obovoidea, valvi 4, semina 1.

Erect annual, 5–35 cm. high, stems tan to reddish brown, simple or racemosely branched, densely white canescent with retrorse hairs; leaves bipinnately dissected, often with a stout broad rachis or the rachis narrow, 1–5 mm. long, puberulent; bracts stiff-coriaceous, bipinnately dissected into linear, acerose lobes, the rachis expanded below, densely white villous below; flowers in heads, 5-merous; calyx unequally cleft, some lobes entire, others 3-lobed or toothed, 6–8 mm. long, densely white

coarse villous above, glabrate below; corolla funnelform, 8–12 mm. long, cream yellow and often spotted or marked with purple, tube 6 mm., throat 3 mm., lobes 3 mm. long; stamens equally inserted on the throat, filaments unequal in length, 1–3 mm. long, exserted from throat; stigma exserted, 2-lobed, lobes 0.5 mm. long; capsule obovoid, 4-valved, 1-celled, 1-seeded, seed brown, smooth or slightly furrowed.

Type. Folsom, Sacramento County, California, July, 1910, *K. Brandegee* (Herbarium of the University of California no. 142954). Other collections. Copperopolis, Calaveras County, *J. Burt Davy 1377;* between Pilot Hill and Cool, Eldorado County, June 3, 1908, *K. Brandegee;* west side Brown's Valley, Solano County, May 2–6, 1891, *W. L. Jepson.*

Range. Foothills of the northern Sierra Nevada, Calaveras to Eldorado and Sacramento counties; Solano County, California.

Navarretia heterandra sp. nov. Plantae simplices vel basi ramosae, 3–20 cm. altae; folia bipinnata-dissecta, inferiora molliter herbacea, superiora rigidentia acerbaque; bracteae divaricate pinnatifidae, infra crasse albae-villosae; flores in capitibus; calyx inaequaliter scissum, lobae inaequales, 2–3 integrae, 2 dentibus duobus vel lobis, membrana sinus inaequaliter, tubus glabratus, lobae albae-villosae; corolla 4-, aliquando 5-mera, caerulea vel alba, calyx inaequalis, 5–7 mm. longum, tubus aliquando pubescens; stamina inaequaliter affixa, 0.5–1 mm. longitudine, inclusa, filamentes inaequales; stigma 2-lobatum, inclusum; capsula obovoidea, valvi 4, semina 1.

Plants simple or branched from the base, erect or radiately spreading, 3–20 cm. high; stems densely white canescent with minute, retrorse hairs; leaves bipinnately dissected, the lobes and rachis slender, lobes of the lower leaves soft-herbaceous becoming pungent and rigid on upper leaves; bracts divaricately pinnatifid with rigid, acerose lobes, densely white villous below with coarse white hairs; flowers sessile in clusters, these aggregated into heads, 4-merous or occasionally one or two 5-merous in the same head; calyx unequally cleft, some to the base, others only two-thirds to base, lobes unequal, usually 3 entire and 2 with lateral teeth or short lobes; sinus membranes unequal, calyx tube white villous above, glabrate on lower half; corolla subequal, longest sepals, 5–7 mm. long, white or blue, tube 4–5 mm. long, sometimes pubescent, throat 1 mm. long, lobes 1 mm. long; stamens unequally inserted on the throat, 0.5–1 mm. long, filaments unequal, anther 0.5 mm. long, included; stigma 2-lobed, included; capsule 4-valved, 1-celled, 1-seeded, seed brown, smooth or slightly furrowed.

Type. "Near Cottonwood, Tehama Co." [Shasta County], June 17, 1934, *J. T. Howell 12223* (Herbarium University of California no. 526143). Other collections. Three miles southeast of Redding, June, 1945, *G. L. Stebbins;* Kelseyville, *K. Brandegee* (?).

The literature of the Polemoniaceae makes repeated references to *Navarretia minima* as occurring in the Coast Ranges of California. The writer has thus far been unable to verify any such record. There are, instead, three inhabitants of vernal pools in Lake County which would key to *N. minima* in the literature, but which differ sufficiently from that species and from each other to warrant separate treatment. Field studies of these species suggest that their differences are related to the edaphic conditions to which they must be genetically adapted. One occurs in a pool in adobe soil, surrounded by white oak savanna; another occupies a pool on volcanic ash-obsidian rubble, surrounded by chaparral; and the third is on the margin of a bog actively building up a peat deposit and is surrounded by a forest of Douglas fir. In all these sites the plants are submerged during the period of germination of the seeds and establishment of the seedlings; they thus begin their life as aquatics. The details of floral morphology are strikingly alike and indicate close interrelationship. However, the great differences in habitat, indicative of considerable physiological differentiation, and the great difference in habit, produced by differences in the vegetative organs, is very striking and warrants specific segregation. These three species with their stamens inserted in the sinuses of the corolla lobes seem more closely related to *N. prostrata* of southern California which has a similar insertion of the stamens than to the northern *N. leucocephala* and *N. minima* in which the stamens are inserted midway on the corolla throat.

Navarretia Bakeri sp. nov. Annua erecta vel expansa, 2–5 cm. alta; caules 0.5–1.4 mm. crassitudine; folia infera simplices lineares vel dentibus raris vel pinnatifidis, supera pinnate seccata lobis raris divaricatis vel proliferatis, subter glabrata, super pilis brevibus crispisque; bracteae foliosae pinnatae, super paribus dentium subter paribus lobarum saepe aut lobis proliferis ad basim aut ex partibus dorsalibus rachis; flores in capitibus; calyx cum membrana ampla ad basim infra sinibus, margo solutus ciliatus, lobae tenues, aristatae; corolla 5–7 mm. longa, alba; stamina in sinibus affixa, exserta; stigma minutum, 2-lobatum, exsertum; capsula 2 mm. longa; semina pauca.

Erect spreading annual, 2–5 cm. high; stems racemosely branched, 0.5–1.5 mm. thick, densely clothed with retrorse crisped hairs; lower leaves linear, entire to few toothed or pinnatifid, upper dissected, lobes often proliferating, glabrate below, pilose with short, crisped hairs above; outer bracts foliaceous, pinnatifid with highly dissected proliferations; bracts within head pinnate with 1–2 pair of teeth in upper third and 1 pair of lobes below middle with proliferating lobes from their bases or from the dorsal surface of the rachis; flowers in heads; calyx lobes unequal, the longest lobes 5.5 mm., slender aristate, with a few weak hairs,

membranous to base in sinuses, free margin of membrane ciliate; corolla white, 5–7 mm. long, tube 4 mm., throat 0.5–1 mm., lobes 1–1.5 mm. long; stamens inserted in the sinuses of corolla lobes, 2.5 mm. long, exserted from throat; style exserted, stigma minutely 2-lobed; capsule about 2 mm. long, the somewhat thickened top breaking away irregularly circumscissily from the membranous base; seeds few, minutely pitted, reddish brown.

Type. In vernal pool in adobe soil surrounded by oak savanna, 1.5 miles southwest of Lower Lake, Lake County, California, June 28, 1945, *H. L. Mason 12599* (Herbarium of the University of California no. 700272). Other collections. 1.5 miles west of Lower Lake, Lake County, (topotype) *Baker 11070;* Sherwood Valley, Mendocino County, *Davy* and *Blasdale 5162;* Trinity County, *Manning 99.*

Range. Vernal pools in meadows of the inner north Coast Ranges from Lake County to Trinity County, California.

Navarretia plieantha sp. nov. Annua prostrata lata 5–20 cm.; caules 0.8–1.4 mm. crassitudine, epidermis saepe exfolians; folia 3–4 cm. longa, integra vel paucis lobis filiformibus remotis rarisque; bracteae foliosae 3–4 capite quoque, 1–2 capites longitudine, pinnatae, lobae 1–2 proliferatae, rachis membranis ciliatis ab utroque latere; capita lata 1–2 cm., 20–50 floribus; calyx 4–5 mm. longum, membrana ciliata-marginata truncata in sinibus, lobae acerosae, subaequales; corolla 5–6 mm. longa, caerulea; stamina in sinibus lobarum corollarum affixa, exserta; stigma aut 2-scissum aut 2-lobatum aut integrum; capsula irregulariter dehiscens, pars summa nonnihil crassa ab lateribus membranosis cum humida frangens; semina 1–3.

Prostrate annuals forming a mat 5–20 cm. broad with several stout branches but not proliferating from below a central head, the main axis often with crisped retrorse hairs, lateral stems glabrate, the epidermis often exfoliating as a white membrane-like tissue; leaves 3–4 cm. long, linear and entire or pinnate with a few remote filiform lobes; outer bracts foliaceous, 3 or 4 to each head, 1–2 times the head, pinnate, the lobes often 2–4 times proliferated or the bract simple pinnate, rachis flanked by a ciliate membrane below, bracts within the inflorescence with from 1 to several pairs of lobes below the middle, entire above or with a pair of acerose teeth; flowers in heads 1.5–2 cm. broad, heads 20–50 flowered; calyx somewhat constricted above, 4–5 mm. long, membranous throughout except for the herbaceous lobes and a line of herbaceous tissue immediately below the lobes, glabrous or with a few weak hairs except for the ciliate margin of the truncated membrane in the sinus of calyx lobes; corolla 5–6 mm. long, blue, funnelform, tube 3–3.5 mm. long, included in calyx tube, throat 0.5 mm., lobes 2 mm. long; stamens inserted in the sinuses of the corolla lobes, 2.5 mm. long; stigma exserted, 2-cleft to 2-lobed or entire; capsule not regularly dehiscent, the somewhat

thickened top breaking away irregularly from the membranous walls when wetted, the seeds working out of the constricted orifice of the calyx and resting on top; seeds about 3 to each capsule, reddish brown and minutely pitted.

Type. In peaty soil of lake margin surrounded by a black oak, madrone, Douglas fir and yellow pine forest. Boggs Lake, northwest slope of Mount Hannah, Lake County, California, June 29, 1945, *H. L. Mason 12628* (Herbarium of the University of California no. 700273).

Navarretia pauciflora sp. nov. Annua prostrata 1–4 cm. alta; hypocotula cortice crassa spongiosaque; caulis filiformis crassus 0.2–0.5 mm.; folia 1–2.5 cm. longa, linearia integraque vel pinnate divisa, glabra; bracteae rarae foliosae, 1–3 capites longitudine paribus pluribus lobarum sub medio; flores 2–10 in capite quoque; calyx cylindricum, 4–5 mm. longum, lobis inaequalis acerosis vel cuspidatis, ad basim sine membrana, membrana truncata et supra ciliata; corolla 5–6 mm. longa, caerulea vel alba; stamina in sinibus lobarum corollarum affixa, aequalia, exserta; stigma bilobata; capsula irregulariter dehiscens, pars summa nonnihil crassa ab muris lateralibus sejuncta; semina 1–plures.

Prostrate annual, 1–4 cm. high and spreading 2–8 cm.; hypocotyl with a thick spongy cortex; stems slender, filiform, 0.2–0.5 mm. thick, white with streaks of purple, densely clothed with short white retrorse crisped hairs or almost glabrous; leaves 1–2.5 cm. long, linear and entire or pinnately parted into 1 or 2 pairs of linear cuspidate lobes each about 2 mm. long, glabrous; outer bracts foliaceous, few, 1.5–3 times the head, with several pairs of lobes below the middle, membranous winged below, those within the head little exceeding the calyx, membranes ciliate margined, lobes acerose to cuspidate; flowers sessile or subsessile in 2–10 flowered heads, heads 4–10 mm. broad; calyx cylindric, 4–5 mm. long, membranous except for the lobes and the narrow band of tissue below them, this often reduced to a single vascular strand, membrane in the sinus truncate across the top and ciliate on the upper margin, lobes pubescent within; corolla funnelform, 5–6 mm. long, blue or white, fading blue, tube 3 mm., throat 1.5 mm., lobes 1.5 mm. long; stamens inserted in the sinuses of corolla lobes, equal in length somewhat exceeding the petals and well exserted from throat; stigma exserted, 2-lobed, lobes minute; capsule irregularly dehiscent, the somewhat thickened top falling away irregularly from the membranous sidewalls, seeds 1–several, minutely pitted, reddish brown.

Type. Playa strewn with obsidion rubble and surrounded by chaparral, 5 miles north of Lower Lake, Lake County, California, *H. L. Mason 12583* (Herbarium of the University of California no. 700271).

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REVIEWS

Nevada Trees. By W. D. Billings. Agricultural Extension Service, University of Nevada, Reno, Bulletin 94, pp. 102, illustrated. June, 1945.

"Nevada Trees" is a popular guide to the native and exotic trees of Nevada. Of the 177 species and varieties, 75 are native and 102 are introduced. The introduced species are readily distinguished by an asterisk preceding the name. Kinds growing on the grounds of the University of Nevada are noted.

The author has followed a phylogenetic sequence rather than arranging the genera and species alphabetically as is, unfortunately, so often done in a popular treatment. The species are grouped by families, the common name being used for the latter. Both the scientific and common name is given for each species. A non-technical key to the genera makes use of vegetative characters. Its use is explained and a glossary of the few technical terms is appended. An index of the common names only is provided.

Thirty-three of the species of most importance or of general interest are described rather fully and are illustrated by photographs. The photographs are supplemented by clear line drawings of the leaves, or, for 16 conifers, by good half-tone reproductions of the cones. The salient characteristics of the other species are briefly described in one or two lines. As the same characters are not always described for the species in a genus and as there is no key to the species, it is sometimes difficult, if not impossible, to make the necessary comparisons to identify the specimen at hand. If, in another edition, keys to species were added, the difficulties with the larger genera such as spruces, willows, and elms would be eliminated. Inclusion of more actual measurements, rather than such phrases as "greater than," would also make identification easier and more precise.

Zonation of the native forest-types in different areas of the state is described in the introduction. An excellent feature is that the complete geographic range of the native species is given in addition to the detailed range in Nevada. A map of the counties is included and care has been taken, in speaking of particular mountain ranges, to refer them to their respective counties. The native home of introduced species is also stated.

The format is pleasing and the paper of better quality than in many war-time publications. Sewing, instead of stapling, would have added to the durability of the bulletin.—Mary L. Bowerman, Department of Botany, University of California, Berkeley.

Hayfever Plants: Their appearance, distribution, time of flowering, and their role in hayfever, with special reference to North America. By Roger P. Wodehouse. Pp. xix + 245, with 73 figs., and 10

tables. The Chronica Botanica Company, Waltham, Mass., 1945; J. W. Stacey, Inc., San Francisco, California. $4.75.

The appearance of the first book on the hayfever plants of North America is in itself an event worthy of note. When such a book is written by one who is a thoroughly trained botanist with long experience with hayfever plants and their pollen, and also has a thorough acquaintance with allergic problems, it bears the stamp of authority and deserves the attention of botanists as well as allergists. Although the book is written primarily for the benefit of practicing allergists, there is much of interest and value for botanists and others who are in any way concerned with the problems of allergy. The book is divided into four chapters: The Botany of Hayfever, The Hayfever Plants—Gymnosperms, The Hayfever Plants—Angiosperms, and Regional Surveys. A brief glossary and an extensive bibliography follow the text.

The chapter on the Botany of Hayfever includes information on the structure of flowers, distinction between entomophilous, anemophilous and amphiphilous flowers, toxicity of pollen, methods of collecting and the identification of atmospheric pollen, and a discussion of some of the botanical literature which will aid in the identification of plants in the various regions of the United States.

In the chapter dealing with the gymnospermous hayfever plants a brief discussion of gymnosperms in general is followed by information upon two families "of interest to students of Hayfever," the Ginkgoaceae and Coniferae. Of the six tribes mentioned in Coniferae, only the Abietineae and Cupressineae are presented in any detail. To those residing on the Pacific Coast, the failure to include *Pinus ponderosa* and *Pseudotsuga* with the discussion of pines, spruces, and firs, may seem a surprising omission. However, since the gymnosperms as a group are of such minor importance in causing hayfever this omission may be excused.

The chapter on the angiospermous hayfever plants includes not only those plants the pollens of which are known to cause hayfever, but most of the genera of wind-pollinated plants of North America. These plants comprise five families of monocotyledons (Typhaceae, Arecaceae, Gramineae, Cyperaceae, and Juncaceae) and twenty-two families of dicotyledons (Salicaceae, Betulaceae, Fagaceae, Casuarinaceae, Juglandaceae, Myricaceae, Ulmaceae, Moraceae, Cannabinaceae, Polygonaceae, Amaranthaceae, Chenopodiaceae, Rosaceae, Platanaceae, Mimosaceae, Fabaceae, Simarubaceae, Tiliaceae, Aceraceae, Oleaceae, Plantaginaceae, and Compositae). Short but effective descriptions, not overburdened with technical language, are given for the families and genera. The inclusion of pollinating dates, description of pollen grains, and the evaluation of the species as probable factors in causing hayfever are of the utmost importance to practicing allergists. The descriptions are supplemented by over sixty original draw-

ings of flowers and other parts of the more important species of hayfever plants and by nearly as many drawings of their pollen grains.

The fourth and last chapter is largely a compilation of the numerous reports and surveys of hayfever plants throughout the United States. These surveys have been grouped into ten sections of the United States, chosen arbitrarily "for convenience of presentation," rather than being based upon political divisions or natural vegetational units. Tables giving the pollinating dates by weeks in the various sections, and references pertaining to these sections accompany the text. The lack of uniformity in the text of the treatment of the hayfever plants for the different sections is unfortunate, as this gives a wrong impression regarding the relative importance of the various groups of plants. In sections I, II, and IV the plants are presented under the three major hayfever seasons, namely, early spring (trees), late spring and early summer (grasses and plantains), and late summer (ragweeds and other weeds). In sections VI, IX, and X the plants are listed under trees, grasses, and weeds. Either one of these methods of presentation is satisfactory as there is much correlation between the major hayfever seasons and the three major groups of hayfever plants. The text in section III (Virginias and Carolinas) consists of brief discussions of the maples, elms, junipers, hickories, oaks, and poplars (all trees), and with only two lines on Bermuda grass and six lines on five weeds. This treatment overemphasizes the place of trees in causing hayfever. In the section on the Southern States (V) the treatment consists of using generic names as *Juniperus, Quercus,* and *Betula* instead of junipers, oaks and birches as in section III. Again, as in that section, one gains the impression that the grasses are of little importance. To botanists and allergists on the Pacific Coast, the text for sections VII (southern California) and VIII (The North Pacific States—northern California, Nevada, Oregon, and Washington) gives the impression that grasses are of little importance as hayfever plants in these two divisions. The text on southern California is comprised of a discussion of five weed-shrubs (*Artemisia, Atriplex, Ambrosia pumila, Franseria,* and *Hymenoclea Salsola*); no mention is made of grasses and trees. It is only after careful examination of table VII (hayfever plants of southern California) and of the references that one is aware of the place of grasses and trees as factors in causing hayfever in this division. In the section on the North Pacific States, thirteen tree groups and ten weed-shrub groups are discussed, but no mention is made of any grasses. However, in the table listing eighty plant groups (genera and species) twenty-three are grasses.

The inconsistent usage of common and generic names as headings and subheadings and the lack of uniformity in the treatment of the hayfever plants in the various regions included in chapter

IV are in direct contrast to the uniformity and excellent treatment of the plants in chapters II and III. Perhaps many of these inconsistencies could have been obviated by more careful editing on the part of the publisher. Whatever fault one may find in the method of treatment of material in chapter IV, it is more than compensated for by the tables of plants and their pollinating dates and in the discussion of the references following the text for each region.

Dr. Wodehouse is to be congratulated for the great service he has done to all practicing allergists in bringing together in this fine volume the great mass of botanical information applicable to the field of allergy.—H. E. McMinn, Mills College, California.

A Synopsis of the North American Species of Delphinium. By Joseph Ewan, University of Colorado Studies, Series D (Physical and Biological Sciences) 2(2): 55–244. f. 1–58. 1945. $1.00.

Like most of the larger genera of North American plants, *Delphinium* has been for many years in need of a thorough and comprehensive new treatment and of a complete re-study of its species. Although it is not possible for one unfamiliar with many of the species of a genus to make an adequate evaluation of a paper of this sort, the one by Joseph Ewan gives evidence of complete competence of workmanship, and many features give testimony of an unusually scholarly approach.

The author does not claim to have made a complete solution of the interrelationships of the major species groups, and he has not chosen names of formal standing to designate them. Consequently, the species are placed in series rather than in subsections, sections, or subgenera. Probably it is recognition of this limitation of the present state of knowledge of the group of plants which has led the author not to attempt to make a key to all the species or to the series recognized by English names. Consequently, he has given regional keys to the species occurring in such areas as, for example, "Washington and Idaho," "California," or "Colorado." It is to be hoped that in time, after further study of the genus it will be possible for the author to provide keys to segregate the major groupings, and to separate all the species according to relationships, rather than according to geography.

The treatment of each species, subspecies, and form is thorough, but the author has not gone to the extreme of detail of citing all of the specimens of common species. However, for all critical points he has backed up his interpretation by citation of specimens. Both the text and the introduction show the results of a long and critical study.

The writer is inclined to wonder about only one major point. In the introduction a list of characters considered as primitive is given. Opposite this there is another list of corresponding characters considered as advanced. It is obvious that some of the

characters such as papillate or scaly seeds may represent specialization and probably, therefore, are indicative of advanced types. However, it is to be wondered whether such a character as relatively simple leaves is to be considered always as necessarily primitive within the genus and whether the corresponding character of more deeply lobed leaves is to be considered necessarily as advanced. The same question might be raised concerning such characters as the relative density of the inflorescence and hairiness of the herbage. The writer is ignorant of the situation in the genus *Delphinium,* and it is quite possible that the primativeness of the characters as described by Mr. Ewan is correct.—Lyman Benson, Department of Botany, Pomona College, Claremont, California.

Forest Tree Breeding and Genetics. By R. H. Richens, M.A. Imperial Agricultural Bureaux, Joint Publication No. 8. November, 1945.

This bulletin is the most comprehensive of the relatively few British publications in the field of forest tree breeding. Its content may be summarized briefly.

A short preface and table of contents precede the fitting foreword by the well-known forester H. G. Champion. The introduction is primarily an argument supporting the need for forest tree breeding in England, seemingly with the intent of overcoming indifference to such work on the part of His Majesty's Forest Commissioners. The next eleven pages are devoted to a generalized (and excellent) discussion of the principles and fundamentals of forest tree breeding. A detailed text of 41 pages follows. The bulletin ends with a glossary, a summary in four languages, and 613 citations to literature on the subject.

According to the preface, the objective of this publication was "to collate the literature on forest tree breeding that has appeared since 1930." This has been done by selecting for discussion 22 topics such as "natural variation," "quality," "selection," "hybridization." The literature on each of the 31 included genera of forest trees is systematically reviewed with relation to the 22 topics chosen.

The table of contents, a very ingenious device, permits ready reference to any one of the 22 topics as it relates to any of the 31 genera considered.

Careful study of the genera treated and the topics discussed reveals that very little recent literature on the subject of forest tree breeding would be excluded in the screening provided by the plan of the bulletin. While it is possible that some publications on the subject may have escaped the attention of the author, due to the war-torn condition of the world for the past few years, it is doubtful whether any considerable amount has thus been overlooked. Furthermore, frequent citations to unpublished material

and ideas indicate that the author canvassed contemporary students of the field in an effort to bring his contribution strictly up to date.

After a study of the literature, the author selected for citation what he considered best. Many papers describing purely local work and papers that are repetitive have not been included. These may be exemplified by the numerous, but not too important, dialectics emanating from central Europe during the mid-thirties in which were debated the relative value of various criteria for distinguishing geographic races of trees.

In terse style the author summarizes the information available on each topic, citing the publications from which the information was extracted. It is difficult to find a phase of forest tree breeding which has been investigated that is not mentioned. Students can find no better guide to the literature on the subject for the time period covered than this bulletin. It will become a permanent point of reference in the literature of forest tree breeding.

I feel that there will be disappointment, however, on the part of the forester or tree breeder when he has finished perusing this pamphlet, not because of the way it is done but rather because it does not go further into the subject. The condensed treatment prevents the author from expanding the ideas presented and in some places the presentation itself suffers from brevity. Also, a critical comparison and evaluation, by Mr. Richens, of the literature on controversial issues has not been possible in the allotted space.—W. P. Stockwell, In Charge, Institute of Forest Genetics, California Forest and Range Experiment Station.

NOTES AND NEWS

Stipa arida in Nevada. In June of 1940 in Nevada, I collected an unusual *Stipa* growing with the rare *Blepharidachne Kingii* (S. Wats.) Hack. on extremely dry lava beds five miles southwest of Lockes, Nye County, Nevada (lat. 38° 28′ N., long. 115° 52′ W., *Pohl 2073*). Dr. F. J. Hermann of the National Arboretum Herbarium, Beltsville, Maryland, kindly identified the *Stipa* for me as *S. arida* M. E. Jones, a plant hitherto known only from Colorado, Utah and Arizona. The Nevada specimens correspond very closely in spikelet characters to material of the type number (*Jones 5377*) in the United States National Herbarium. They are considerably more mature than the Jones specimen, however, and show certain features of the fruit which are not well exhibited in the latter. The body of the fruit becomes a golden brown at maturity. The awn, while frequently merely somewhat flexuous, may at full maturity develop a definite geniculum about a centimeter above its base. The proximal portion of the awn, below this geniculum, becomes brown in color like the body of the fruit, and is banded with whitish stripes along the edges of the loose

spiral into which it is twisted. The distal portion of the awn is not twisted and is whitish in color.—Richard W. Pohl, Department of Botany, University of Pennsylvania, Philadelphia.

Viola odorata in California. A violet having deep reddish violet flowers and long, leafy runners was found at an altitude of 5500 feet at Pinecrest, Tuolumne County, California, on February 24, 1945, by Mrs. Anita Hewick and was referred to me by Miss Elizabeth E. Morse of Berkeley, California, to whom it was sent. The plant is *Viola odorata* L., the Fragrant Violet or the English Violet and is a native of the old world where it occurs in England, on the continent of Europe, east in Asia to the Caucasus Mountains, and again in Northern Africa. It is probably the violet often mentioned by that earliest of botanical writers, the Greek philosopher, Theophrastus, who lived some three hundred years before Christ. An early introduction into American gardens, it has long been enjoyed for its color and fragrance. In some of our eastern and western states it has escaped from cultivation and when found away from a dwelling and growing "wild" it is natural to confuse it with our own native violets.

The only native violet with runners growing in the vicinity of Pinecrest is a small white violet (*V. Macloskeyi*). There is, however, a species with violet colored flowers, the Hooked Spur Violet (*V. adunca*) which later in the season has elongated stems, but these stems are not runners.

Viola odorata differs from any of our native North American violets in having a style in which the tip is bent downward like a hook. Also, the stem of the ripened seed pod bends downward and so more safely plants the cream-colored seeds. These characteristics, together with the color and fragrance of the flowers, and the long leafy runners make this violet readily recognizable.

The violets sold today in the florist shops have been made by crossing *Viola odorata* with one of our North American violets, the Meadow or Hooded Blue Violet, *V. papilionacea* (?). The result of this crossing is a bigger violet, but, unfortunately, much of the fragrance is lost.—Viola Brainerd Baird, Berkeley, California.

On March 23, 1946, the California Botanical Society held its first annual dinner meeting since Pearl Harbor at the Hotel Shattuck, Berkeley. Dr. C. Y. Chang, Professor of Botany, University of Peking, spoke on "Botany in War Time China" and told of the need for maintaining the Chinese universities during the war period and of the difficulties encountered. It was necessary to move the universities more than once, the students and faculty walking for as much as a thousand miles to reach the new locations. Furthermore, it was necessary for them to build their own living quarters and laboratories, to get along with very few microscopes and without up-to-date text books. Once during a Japa-

nese bombing attack, the laboratories were destroyed and had to be completely rebuilt. Yet in spite of these many difficulties the classes continued to meet and the faculty, by devising substitute equipment, managed to carry on a research program and give vital scientific information to the government.

The annual meeting of the Pacific Division of the American Association for the Advancement of Science and affiliated societies will be held this summer from June 17 to 22 at the University of Nevada, Reno.

Dr. Rogers McVaugh, Acting Curator of the National Arboretum Herbarium, Bureau of Plant Industry, Beltsville, Maryland, has accepted the position of Curator of Phanerogams, University Museums, University of Michigan, Ann Arbor.

Dr. Philip A. Munz, now at the Bailey Hortoreum, Ithaca, New York, is returning to California as Botanist at the Rancho Santa Ana Botanic Garden, Anaheim, a position which has been vacant since Dr. Carl Wolf resigned a year ago to take over the management of extensive citrus holdings. Dr. Munz will assume his duties at the Garden August 1, 1946.